

SEQUENCE LISTING

<110> Yanagi, Masayuki
Emerson, Susanne U.
Purcell, Robert H.
Bukh, Jens

<120> CLONED GENOMES OF INFECTIOUS HEPATITIS C VIRUSES AND
USES THEREOF

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<150> US 60/053,062

<151> 1997-07-18

<150> US 09/014,416

<151> 1998-01-27

<160> 65

<170> PatentIn Ver. 2.1

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<213> Hepatitis C virus

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Arg Arg Arg Ser Arg Asn Leu Gly Lys Val Ile Asp Thr Leu Thr Cys
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Gly Gly Ala Ala Arg Ala Leu Ala His Gly Val Arg Val Leu Glu Asp
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Gly Val Asn Tyr Ala Thr Gly Asn Leu Pro Gly Cys Ser Phe Ser Ile
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Phe Leu Leu Ala Leu Leu Ser Cys Leu Thr Val Pro Ala Ser Ala Tyr
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Gln Val Arg Asn Ser Ser Gly Leu Tyr His Val Thr Asn Asp Cys Pro
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Asn Ser Ser Ile Val Tyr Glu Ala Ala Asp Ala Ile Leu His Thr Pro
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Gly Cys Val Pro Cys Val Arg Glu Gly Asn Ala Ser Arg Cys Trp Val
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Ala Val Thr Pro Thr Val Ala Thr Arg Asp Gly Lys Leu Pro Thr Thr
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Ser Ala Leu Tyr Val Gly Asp Leu Cys Gly Ser Val Phe Leu Val Gly
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Gln Leu Phe Thr Phe Ser Pro Arg Arg His Trp Thr Thr Gln Asp Cys
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Asn Cys Ser Ile Tyr Pro Gly His Ile Thr Gly His Arg Met Ala Trp
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Asp Met Met Met Asn Trp Ser Pro Thr Ala Ala Leu Val Val Ala Gln
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Leu Leu Arg Ile Pro Gln Ala Ile Met Asp Met Ile Ala Gly Ala His
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Trp Gly Val Leu Ala Gly Ile Ala Tyr Phe Ser Met Val Gly Asn Trp
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Ala Lys Val Leu Val Val Leu Leu Leu Phe Ala Gly Val Asp Ala Glu
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Thr His Val Thr Gly Gly Asn Ala Gly Arg Thr Thr Ala Gly Leu Val
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Gly Leu Leu Thr Pro Gly Ala Lys Gln Asn Ile Gln Leu Ile Asn Thr
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Asn Gly Ser Trp His Ile Asn Ser Thr Ala Leu Asn Cys Asn Glu Ser
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Leu Asn Thr Gly Trp Leu Ala Gly Leu Phe Tyr Gln His Lys Phe Asn
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Ser Ser Gly Cys Pro Glu Arg Leu Ala Ser Cys Arg Arg Leu Thr Asp
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Phe Ala Gln Gly Trp Gly Pro Ile Ser Tyr Ala Asn Gly Ser Gly Leu
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Asp Glu Arg Pro Tyr Cys Trp His Tyr Pro Pro Arg Pro Cys Gly Ile
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Val Pro Ala Lys Ser Val Cys Gly Pro Val Tyr Cys Phe Thr Pro Ser
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Pro Val Val Val Gly Thr Thr Asp Arg Ser Gly Ala Pro Thr Tyr Ser
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Trp Gly Ala Asn Asp Thr Asp Val Phe Val Leu Asn Asn Thr Arg Pro
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Pro Leu Gly Asn Trp Phe Gly Cys Thr Trp Met Asn Ser Thr Gly Phe
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Thr Lys Val Cys Gly Ala Pro Pro Cys Val Ile Gly Gly Val Gly Asn
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Asn Thr Leu Leu Cys Pro Thr Asp Cys Phe Arg Lys His Pro Glu Ala
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Thr Tyr Ser Arg Cys Gly Ser Gly Pro Trp Ile Thr Pro Arg Cys Met
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Val Asp Tyr Pro Tyr Arg Leu Trp His Tyr Pro Cys Thr Ile Asn Tyr
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Asn Val Arg Gly Gly Arg Asp Ala Val Ile Leu Leu Met Cys Val Val
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His Pro Thr Leu Val Phe Asp Ile Thr Lys Leu Leu Leu Ala Ile Phe
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Gly Pro Leu Trp Ile Leu Gln Ala Ser Leu Leu Lys Val Pro Tyr Phe
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Ala Gly Gly His Tyr Val Gln Met Ala Ile Ile Lys Leu Gly Ala Leu
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Thr Gly Thr Tyr Val Tyr Asn His Leu Thr Pro Leu Arg Asp Trp Ala
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His Asn Gly Leu Arg Asp Leu Ala Val Ala Val Glu Pro Val Val Phe
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Ser Arg Met Glu Thr Lys Leu Ile Thr Trp Gly Ala Asp Thr Ala Ala
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Cys Gly Asp Ile Ile Asn Gly Leu Pro Val Ser Ala Arg Arg Gly Gln
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Phe Cys His Ser Lys Lys Lys Cys Asp Glu Leu Ala Ala Lys Leu Val
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Val Ile Pro Thr Ser Gly Asp Val Val Val Val Ser Thr Asp Ala Leu
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Met Thr Gly Phe Thr Gly Asp Phe Asp Ser Val Ile Asp Cys Asn Thr
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Cys Val Thr Gln Thr Val Asp Phe Ser Leu Asp Pro Thr Phe Thr Ile
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Glu Thr Thr Thr Leu Pro Gln Asp Ala Val Ser Arg Thr Gln Arg Arg
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Gly Arg Thr Gly Arg Gly Lys Pro Gly Ile Tyr Arg Phe Val Ala Pro
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Gly Glu Arg Pro Ser Gly Met Phe Asp Ser Ser Val Leu Cys Glu Cys
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Asp Ala His Phe Leu Ser Gln Thr Lys Gln Ser Gly Glu Asn Phe Pro
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Gly Val Leu Ala Ala Leu Ala Ala Tyr Cys Leu Ser Thr Gly Cys Val
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Ala Ala Thr Ala Phe Val Gly Ala Gly Leu Ala Gly Ala Ala Ile Gly
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Ser Val Gly Leu Gly Lys Val Leu Val Asp Ile Leu Ala Gly Tyr Gly
 1845 1850 1855

Ala Gly Val Ala Gly Ala Leu Val Ala Phe Lys Ile Met Ser Gly Glu
 1860 1865 1870

Val Pro Ser Thr Glu Asp Leu Val Asn Leu Leu Pro Ala Ile Leu Ser
 1875 1880 1885

Pro Gly Ala Leu Val Val Gly Val Val Cys Ala Ala Ile Leu Arg Arg
1890 1895 1900

His Val Gly Pro Gly Glu Gly Ala Val Gln Trp Met Asn Arg Leu Ile
1905 1910 1915 1920

Ala Phe Ala Ser Arg Gly Asn His Val Ser Pro Thr His Tyr Val Pro
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Glu Ser Asp Ala Ala Ala Arg Val Thr Ala Ile Leu Ser Ser Leu Thr
1940 1945 1950

Val Thr Gln Leu Leu Arg Arg Leu His Gln Trp Ile Ser Ser Glu Cys
1955 1960 1965

Thr Thr Pro Cys Ser Gly Ser Trp Leu Arg Asp Ile Trp Asp Trp Ile
1970 1975 1980

Cys Glu Val Leu Ser Asp Phe Lys Thr Trp Leu Lys Ala Lys Leu Met
1985 1990 1995 2000

Pro Gln Leu Pro Gly Ile Pro Phe Val Ser Cys Gln Arg Gly Tyr Arg
2005 2010 2015

Gly Val Trp Arg Gly Asp Gly Ile Met His Thr Arg Cys His Cys Gly
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Pro Ser Leu Lys Ala Thr Cys Thr Ala Asn His Asp Ser Pro Asp Ala
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Asp Pro Leu Val Ala Glu Glu Asp Glu Arg Glu Val Ser Val Pro Ala
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<211> 3010

<212> PRT

<213> Hepatitis C virus

<400> 3

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Gly Val Tyr Leu Leu Pro Arg Arg Gly Pro Arg Leu Gly Val Arg Ala
35 40 45

Thr Arg Lys Ala Ser Glu Arg Ser Gln Pro Arg Gly Arg Arg Gln Pro
50 55 60

Ile Pro Lys Ala Arg Arg Pro Glu Gly Arg Ala Trp Ala Gln Pro Gly
65 70 75 80

Tyr Pro Trp Pro Leu Tyr Gly Asn Glu Gly Leu Gly Trp Ala Gly Trp
85 90 95

Leu Leu Ser Pro Arg Gly Ser Arg Pro Ser Trp Gly Pro Thr Asp Pro
100 105 110

Arg Arg Arg Ser Arg Asn Leu Gly Lys Val Ile Asp Thr Leu Thr Cys
115 120 125

Gly Phe Ala Asp Leu Met Gly Tyr Ile Pro Leu Val Gly Ala Pro Leu
130 135 140

Gly Gly Ala Ala Arg Ala Leu Ala His Gly Val Arg Val Leu Glu Asp
145 150 155 160

Gly Val Asn Tyr Ala Thr Gly Asn Leu Pro Gly Cys Ser Phe Ser Ile
165 170 175

Phe Leu Leu Ala Leu Leu Ser Cys Leu Thr Ile Pro Ala Ser Ala Tyr
180 185 190

Glu Val Arg Asn Val Ser Gly Ile Tyr His Val Thr Asn Asp Cys Ser
195 200 205

Asn Ser Ser Ile Val Tyr Glu Ala Ala Asp Val Ile Met His Thr Pro
210 215 220

Gly Cys Val Pro Cys Val Gln Glu Gly Asn Ser Ser Arg Cys Trp Val

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	260		265		270	
Ser Ala Met Tyr Val Gly Asp Leu Cys Gly Ser Ile Phe Leu Val Ser						
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Gln Leu Phe Thr Phe Ser Pro Arg Arg His Glu Thr Val Gln Asp Cys						
	290		295		300	
Asn Cys Ser Ile Tyr Pro Gly His Val Ser Gly His Arg Met Ala Trp						
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Asp Met Met Met Asn Trp Ser Pro Thr Thr Ala Leu Val Val Ser Gln						
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Thr His Thr Thr Gly Arg Val Ala Gly His Thr Thr Ser Gly Phe Thr						
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Ser Leu Phe Ser Ser Gly Ala Ser Gln Lys Ile Gln Leu Val Asn Thr						
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Asn Gly Ser Trp His Ile Asn Arg Thr Ala Leu Asn Cys Asn Asp Ser						
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Leu Gln Thr Gly Phe Phe Ala Ala Leu Phe Tyr Ala His Lys Phe Asn						
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Ser Ser Gly Cys Pro Glu Arg Met Ala Ser Cys Arg Pro Ile Asp Trp						
	450		455		460	
Phe Ala Gln Gly Trp Gly Pro Ile Thr Tyr Thr Lys Pro Asn Ser Ser						
	465		470		475	480
Asp Gln Arg Pro Tyr Cys Trp His Tyr Ala Pro Arg Pro Cys Gly Val						

485

490

495

Val Pro Ala Ser Gln Val Cys Gly Pro Val Tyr Cys Phe Thr Pro Ser
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Pro Val Val Val Gly Thr Thr Asp Arg Ser Gly Val Pro Thr Tyr Ser
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Trp Gly Glu Asn Glu Thr Asp Val Met Leu Leu Asn Asn Thr Arg Pro
530 535 540

Pro Gln Gly Asn Trp Phe Gly Cys Thr Trp Met Asn Ser Thr Gly Phe
545 550 555 560

Thr Lys Thr Cys Gly Gly Pro Pro Cys Asn Ile Gly Gly Val Gly Asn
565 570 575

Arg Thr Leu Ile Cys Pro Thr Asp Cys Phe Arg Lys His Pro Glu Ala
580 585 590

Thr Tyr Thr Lys Cys Gly Ser Gly Pro Trp Leu Thr Pro Arg Cys Leu
595 600 605

Val Asp Tyr Pro Tyr Arg Leu Trp His Tyr Pro Cys Thr Leu Asn Phe
610 615 620

Ser Ile Phe Lys Val Arg Met Tyr Val Gly Gly Val Glu His Arg Leu
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Asn Ala Ala Cys Asn Trp Thr Arg Gly Glu Arg Cys Asn Leu Glu Asp
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Arg Asp Arg Ser Glu Leu Ser Pro Leu Leu Leu Ser Thr Thr Glu Trp
660 665 670

Gln Ile Leu Pro Cys Ala Phe Thr Thr Leu Pro Ala Leu Ser Thr Gly
675 680 685

Leu Ile His Leu His Gln Asn Ile Val Asp Val Gln Tyr Leu Tyr Gly
690 695 700

Val Gly Ser Ala Phe Val Ser Phe Ala Ile Lys Trp Glu Tyr Ile Leu
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Leu Leu Phe Leu Leu Leu Ala Asp Ala Arg Val Cys Ala Cys Leu Trp
725 730 735

Met Met Leu Leu Ile Ala Gln Ala Glu Ala Ala Leu Glu Asn Leu Val

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Leu Val Phe Phe Cys Ala Ala Trp Tyr Ile Lys Gly Arg Leu Ala Pro		
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Gly Ala Ala Tyr Ala Phe Tyr Gly Val Trp Pro Leu Leu Leu Leu Leu		
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Leu Ala Leu Pro Pro Arg Ala Tyr Ala Leu Asp Arg Glu Met Ala Ala		
805	810	815
Ser Cys Gly Gly Ala Val Leu Val Gly Leu Val Phe Leu Thr Leu Ser		
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Pro Tyr Tyr Lys Val Phe Leu Thr Arg Leu Ile Trp Trp Leu Gln Tyr		
835	840	845
Phe Ile Thr Arg Ala Glu Ala His Met Gln Val Trp Val Pro Pro Leu		
850	855	860
Asn Val Arg Gly Gly Arg Asp Ala Ile Ile Leu Leu Thr Cys Ala Val		
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His Pro Glu Leu Ile Phe Asp Ile Thr Lys Leu Leu Leu Ala Ile Leu		
885	890	895
Gly Pro Leu Met Val Leu Gln Ala Gly Ile Thr Arg Val Pro Tyr Phe		
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Val Arg Ala Gln Gly Leu Ile Arg Ala Cys Met Leu Val Arg Lys Val		
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Ala Gly Gly His Tyr Val Gln Met Val Phe Met Lys Leu Gly Ala Leu		
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Thr Gly Thr Tyr Val Tyr Asn His Leu Thr Pro Leu Arg Asp Trp Ala		
945	950	955 960
His Ala Gly Leu Arg Asp Leu Ala Val Ala Val Glu Pro Val Val Phe		
965	970	975
Ser Ala Met Glu Thr Lys Val Ile Thr Trp Gly Ala Asp Thr Ala Ala		
980	985	990
Cys Gly Asp Ile Ile Leu Gly Leu Pro Val Ser Ala Arg Arg Gly Lys		

995

1000

1005

Glu Ile Phe Leu Gly Pro Ala Asp Ser Leu Glu Gly Gln Gly Trp Arg
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Leu Leu Ala Pro Ile Thr Ala Tyr Ser Gln Gln Thr Arg Gly Val Leu
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Gly Cys Ile Ile Thr Ser Leu Thr Gly Arg Asp Lys Asn Gln Val Glu
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Gly Glu Val Gln Val Val Ser Thr Ala Thr Gln Ser Phe Leu Ala Thr
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Cys Ile Asn Gly Val Cys Trp Thr Val Tyr His Gly Ala Gly Ser Lys
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Thr Leu Ala Gly Pro Lys Gly Pro Ile Thr Gln Met Tyr Thr Asn Val
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Asp Leu Asp Leu Val Gly Trp Gln Ala Pro Pro Gly Ala Arg Ser Met
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Cys Thr Arg Gly Val Ala Lys Ala Val Asp Phe Ile Pro Val Glu Ser
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Met Glu Thr Thr Met Arg Ser Pro Val Phe Thr Asp Asn Ser Thr Pro
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Gly Ser Gly Lys Ser Thr Lys Val Pro Ala Ala Tyr Ala Ala Gln Gly
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Tyr Lys Val Leu Val Leu Asn Pro Ser Val Ala Ala Thr Leu Gly Phe

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1765

1770

1775

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Phe Asn Ile Leu Gly Gly Trp Val Ala Ala Gln Leu Ala Pro Pro Ser
 1810 1815 1820

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Ser Ile Gly Leu Gly Lys Val Leu Val Asp Ile Leu Ala Gly Tyr Gly
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His Val Gly Pro Gly Glu Gly Ala Val Gln Trp Met Asn Arg Leu Ile
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 1970 1975 1980

Cys Thr Val Leu Thr Asp Phe Lys Thr Trp Leu Gln Ser Lys Leu Leu
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2020

2025

2030

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<212> DNA

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Ile Pro Lys Ala Arg Arg Pro Glu Gly Arg Ala Trp Ala Gln Pro Gly
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Tyr Pro Trp Pro Leu Tyr Gly Asn Glu Gly Leu Gly Trp Ala Gly Trp
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Leu Leu Ser Pro Arg Gly Ser Arg Pro Ser Trp Gly Pro Thr Asp Pro
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Arg Arg Arg Ser Arg Asn Leu Gly Lys Val Ile Asp Thr Leu Thr Cys
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Phe Leu Leu Ala Leu Leu Ser Cys Leu Thr Ile Pro Ala Ser Ala Tyr
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Glu Val Arg Asn Val Ser Gly Ile Tyr His Val Thr Asn Asp Cys Ser
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His Pro Thr Leu Val Phe Asp Ile Thr Lys Leu Leu Leu Ala Ile Phe
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Thr Gly Thr Tyr Val Tyr Asn His Leu Thr Pro Leu Arg Asp Trp Ala
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<212> DNA

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<211> 35

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<211> 16

<212> DNA

<213> Hepatitis C virus

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<211> 19

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<211> 82

<212> DNA

<213> Hepatitis C virus

<400> 55

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<210> 56

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<212> DNA

<213> Hepatitis C virus

<400> 56

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<212> DNA

<213> Hepatitis C virus

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<213> Hepatitis C virus

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<212> DNA

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